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Mobile Information Systems

Wearable Computing/Wireless Technology Development Bath Iron Works

The Team

SBCC

Uniform Support Center

NATIONAL INSTRUMENTS
DISCOVER the

Cisco Systems
Empowering the Internet Generation

TSI

VIA

Red Raven Co

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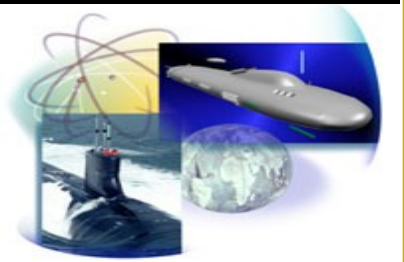
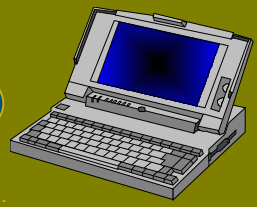
GENERAL DYNAMICS
Electric Boat



IT at the Site of Work

Legacy IT

LAWN



- **Processors:** Cyrix GXi 180 MHz, up to 64 MB RAM
- **Peripherals:** Video Capture, 1553 Bus, GPS
- **Displays:** Hand-held, Head-mounted
- **Connectivity:** Wireless LAN, Cell Phone, Digital Radio
- **Data Storage:** 2.1 or 3.2 GB 2.5" Disk Drive

PAN/PUI

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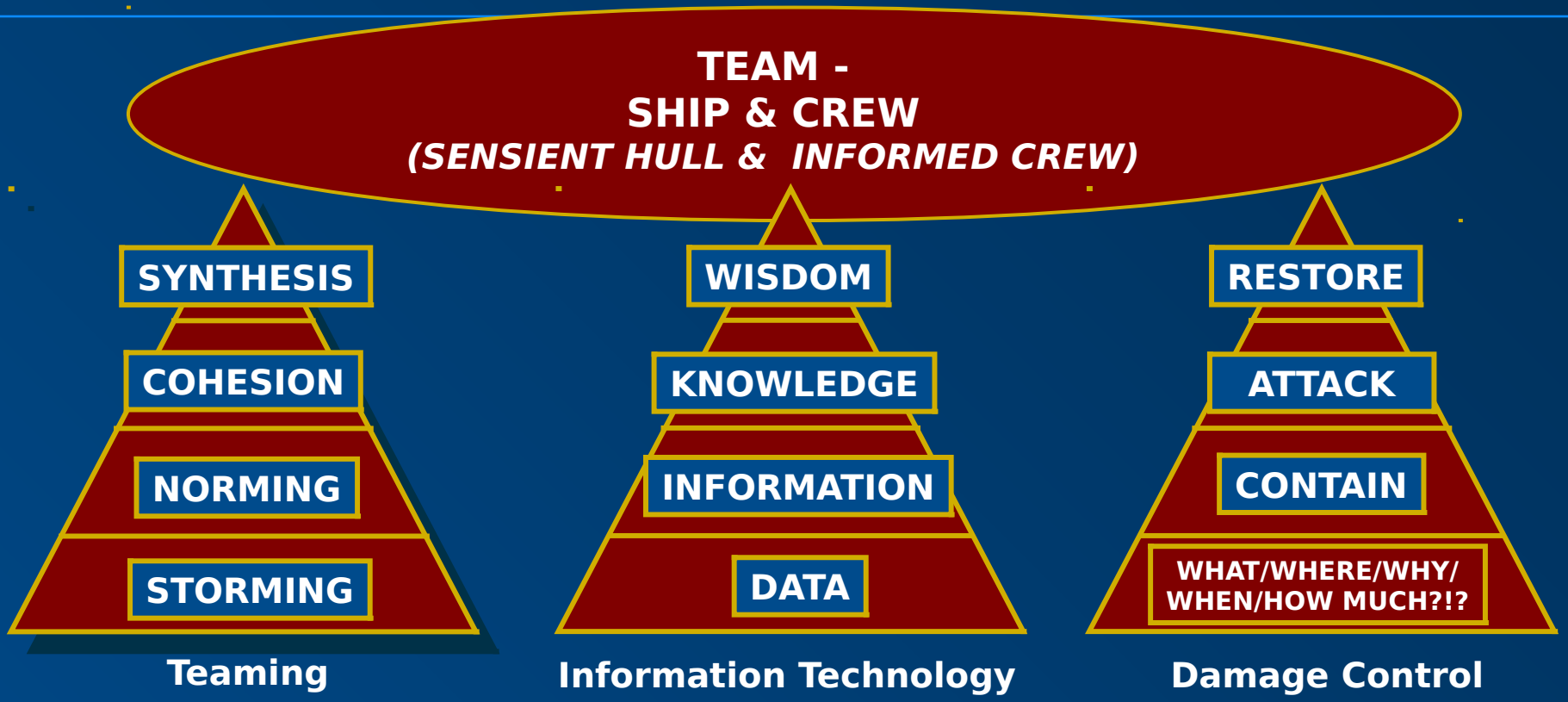
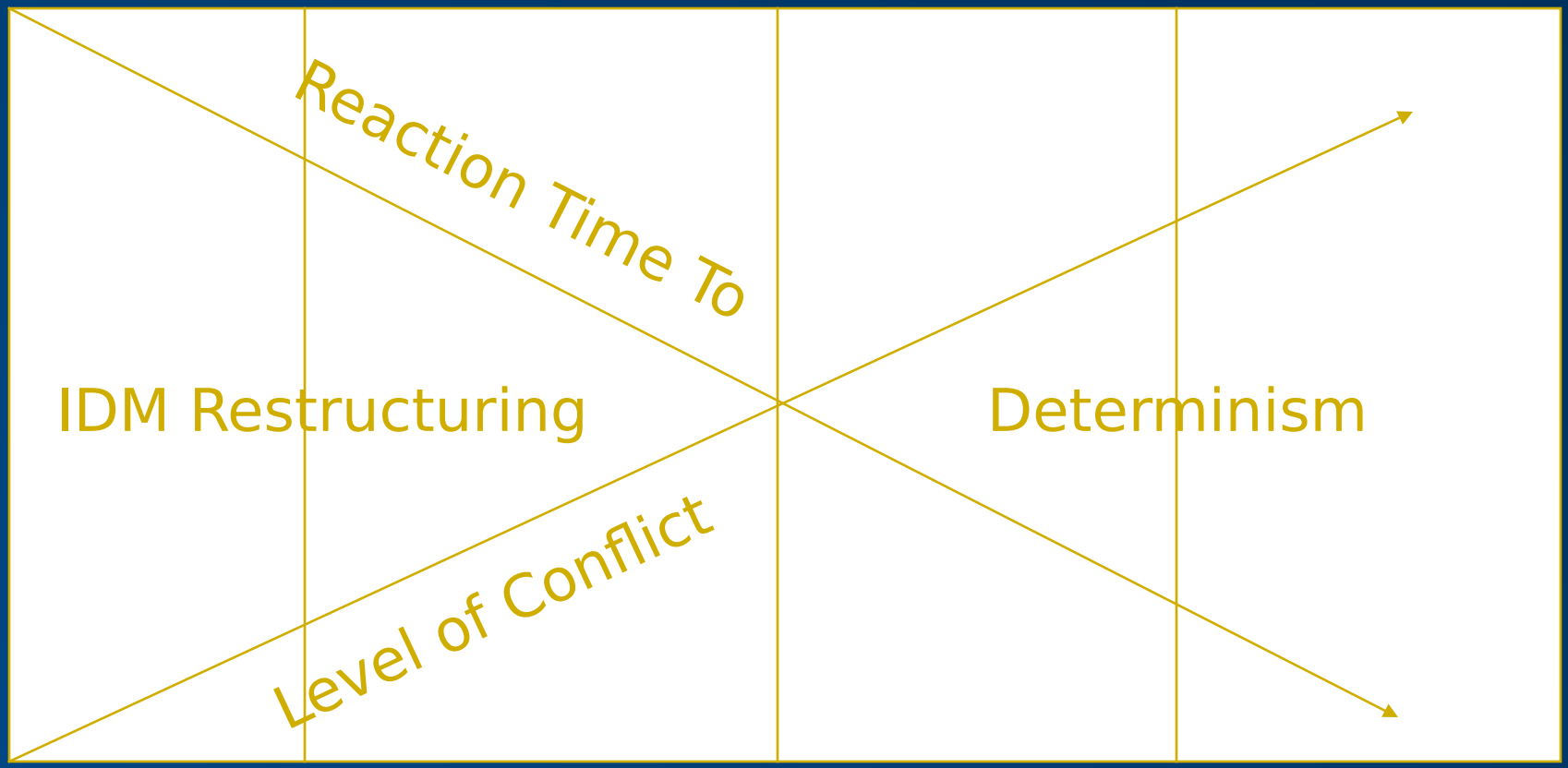
Information and Team Models



- Use of full duplex VIVOD
- CSOSS / EOSS / MSFD at all points
- "Sensient Hull" components

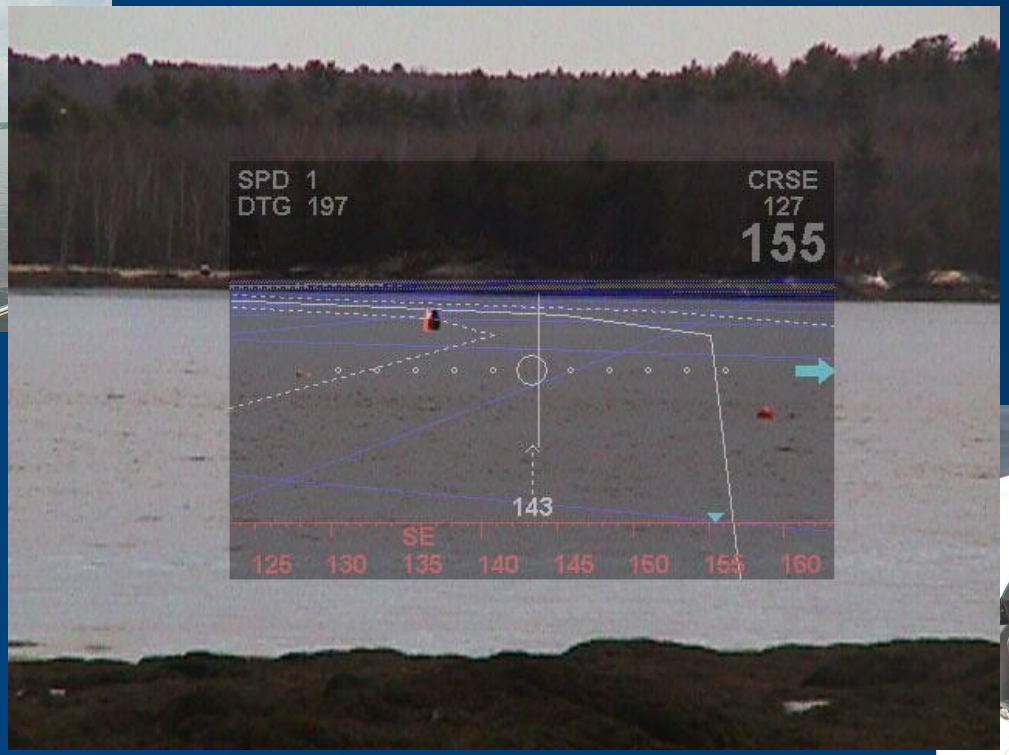
The Conflict Model - Determinism vs To

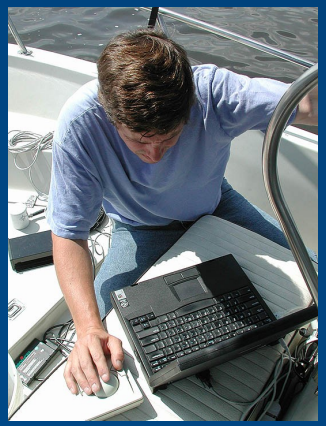


Work and research Projects to Date

Augmented Reality

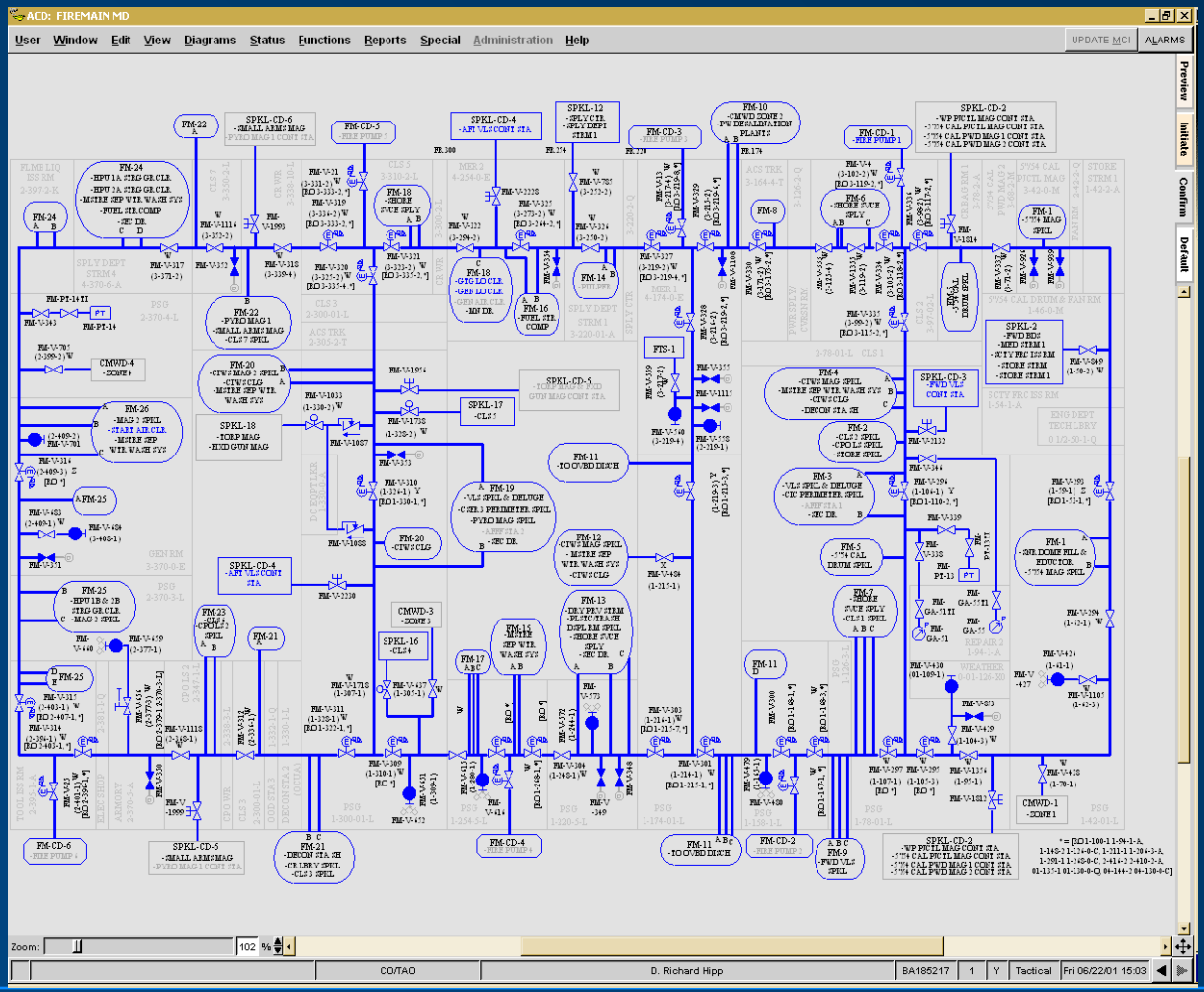
Current Testing



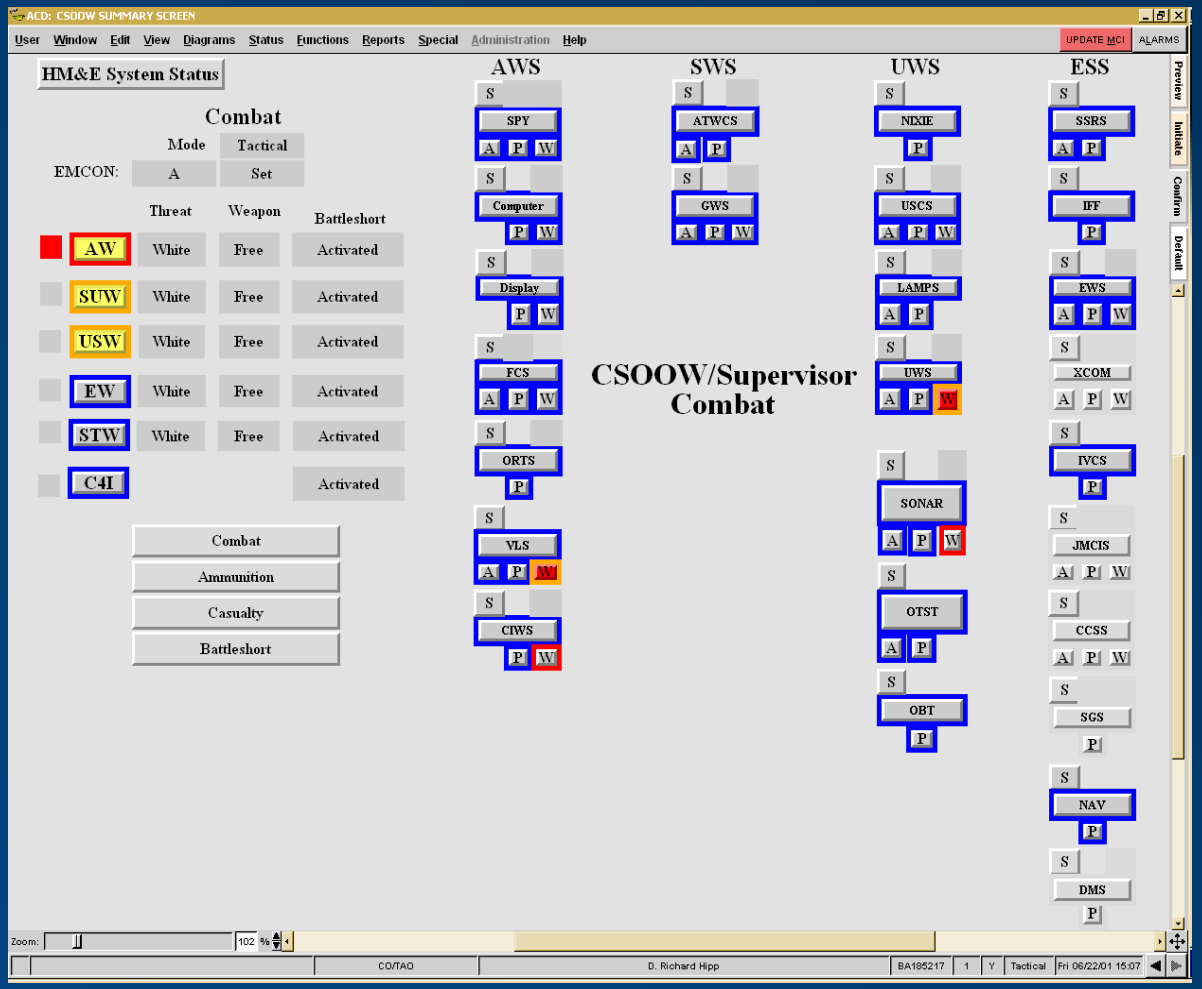


Automated Common Diagrams

ACD Main Diagram



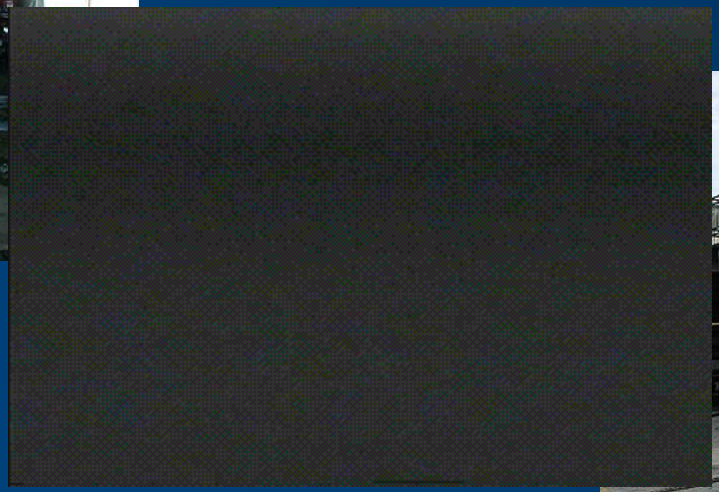
CSOOW Status Screen



NDI-FFE (Wireless Fire-Fighting Ensemble)

The “WFFE”

“A” and “B” Fire Testing



Remotely Operated Valves and Sensor Node Units

(ROV/SNU)

Remotely Operated Valves and Sensor Node Units (ROV and SNU)

Heavy Production Support (LWCS)

Wireless Wearable Computers at Work at the Land Level Transfer Facility

Significant Features:

- 21st Century design means process flexibility
- 3 level ship ways & 3 landing grids for dry dock
- Floating dry dock (28,000 lift capacity) Manufacturing Support Center (70,000 sq. ft.)
- Max combined lift on LLTF = 600 tons

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RF Coverage for Wearable Computers

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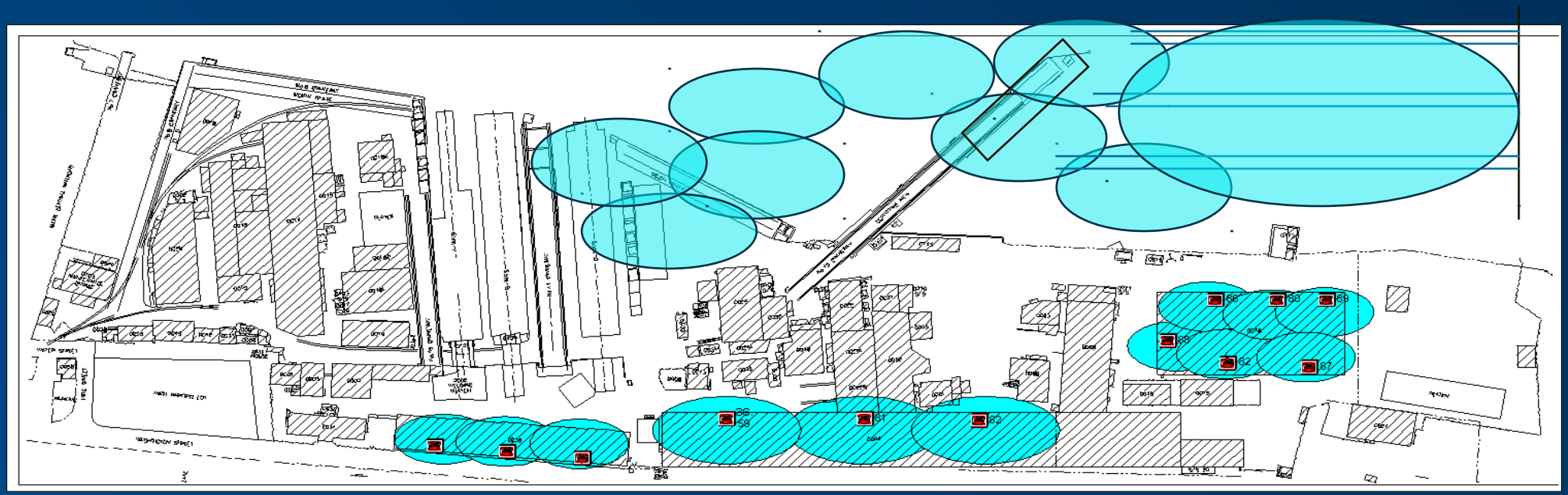

Robust Wireless IT at Work Site

Constructors and Engineers Communicating Real Time

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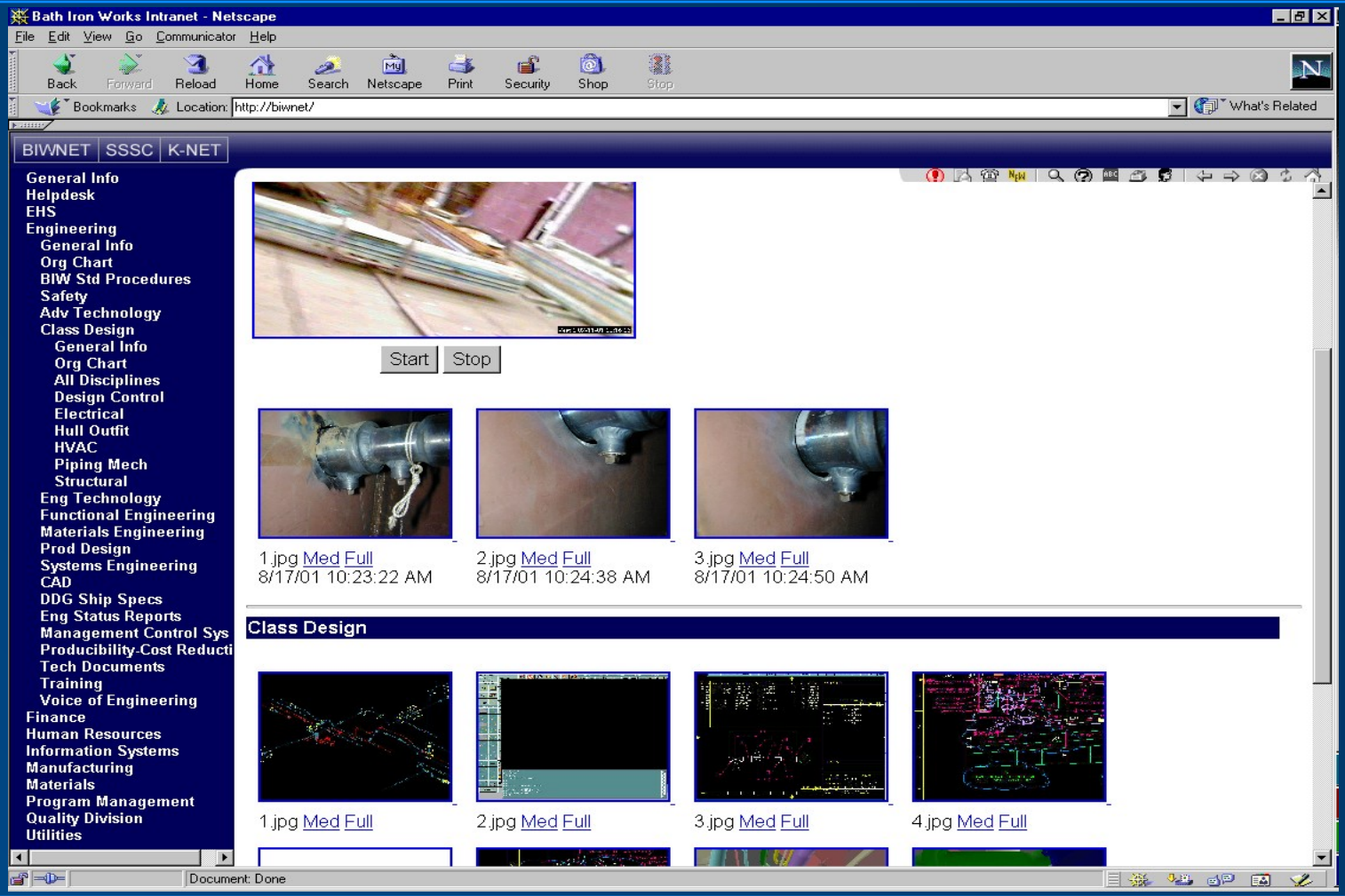
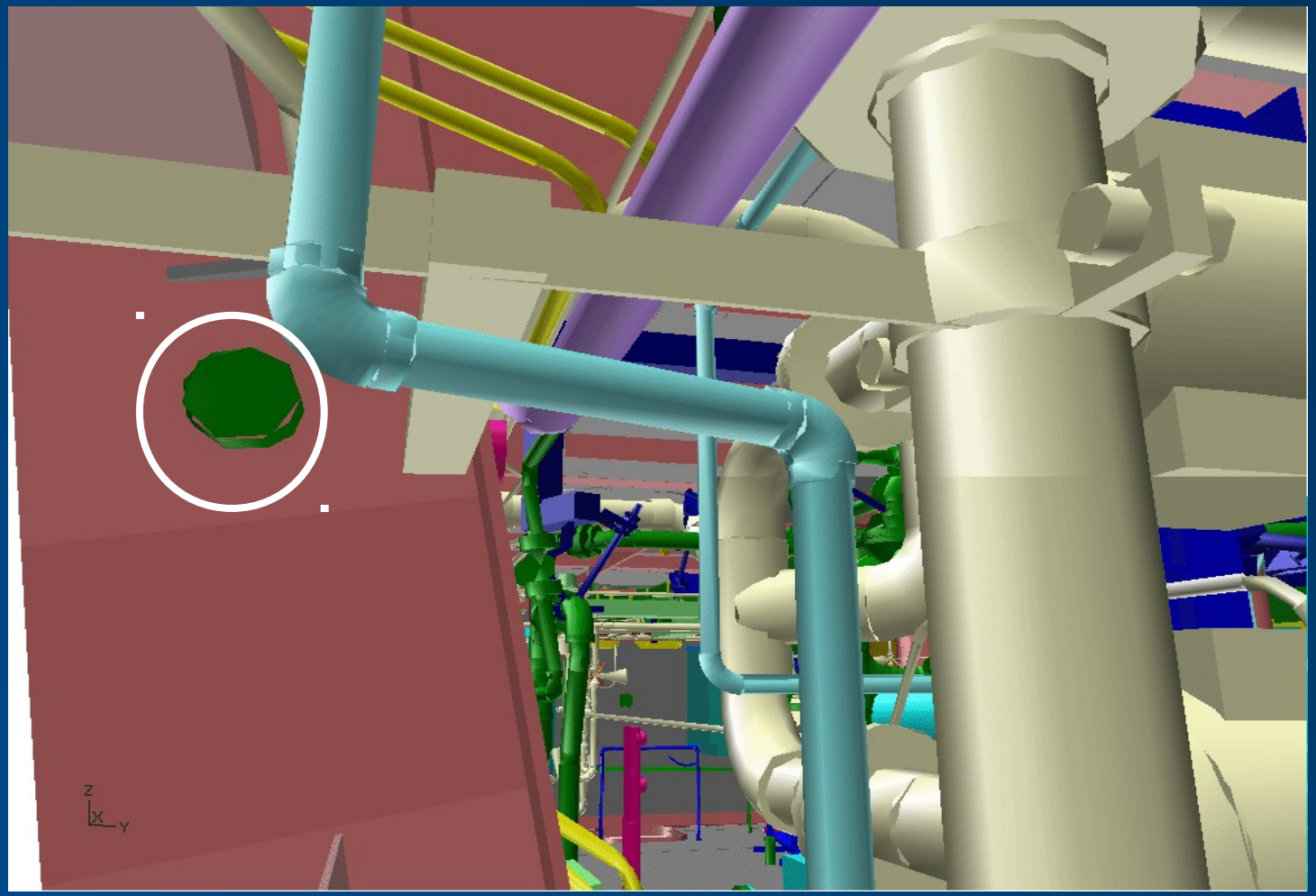
BIW Wireless Website

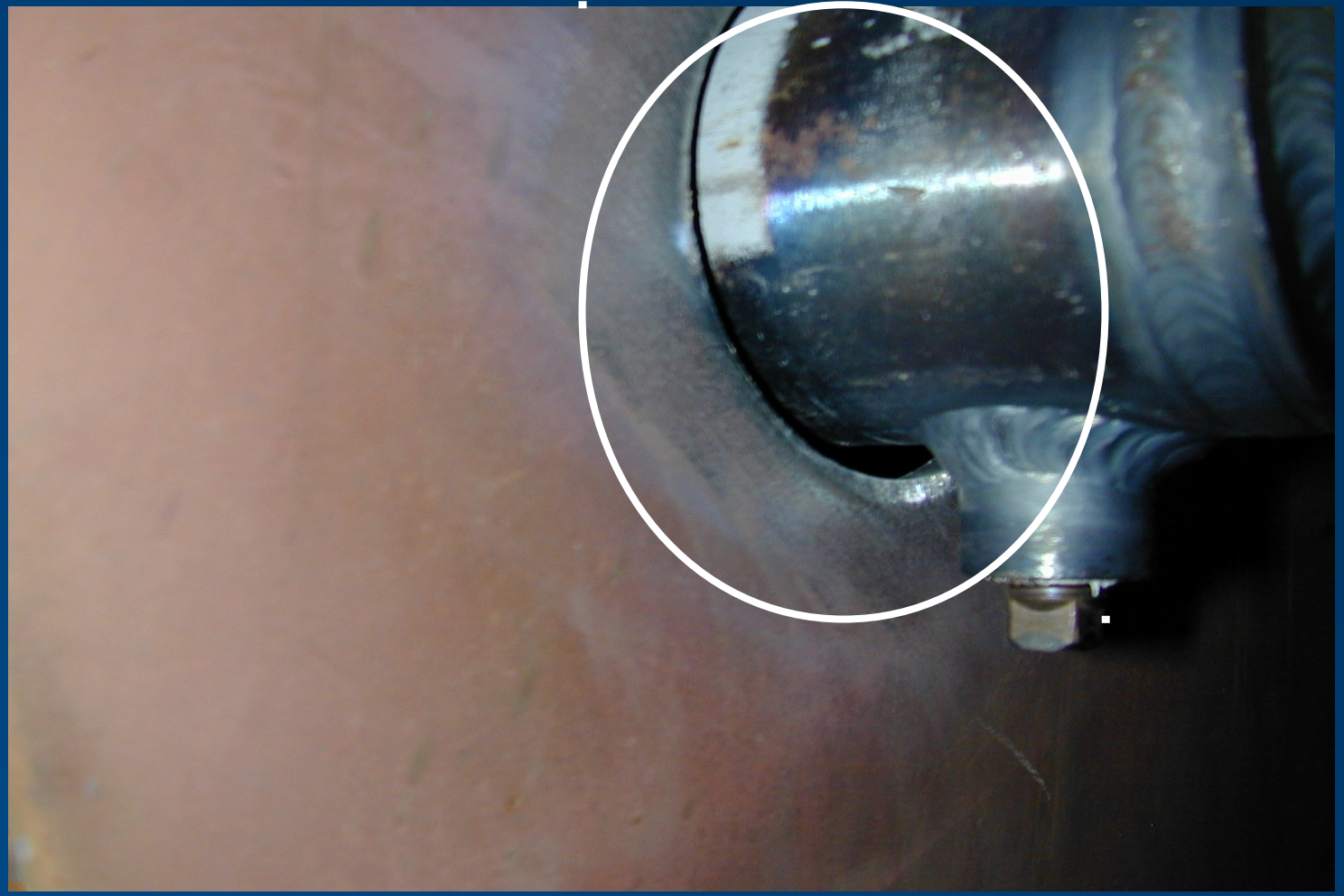


PVC Image of QA “Hot Spot”



QA Evaluation of a Piping Weld

QA Follow-Up Image



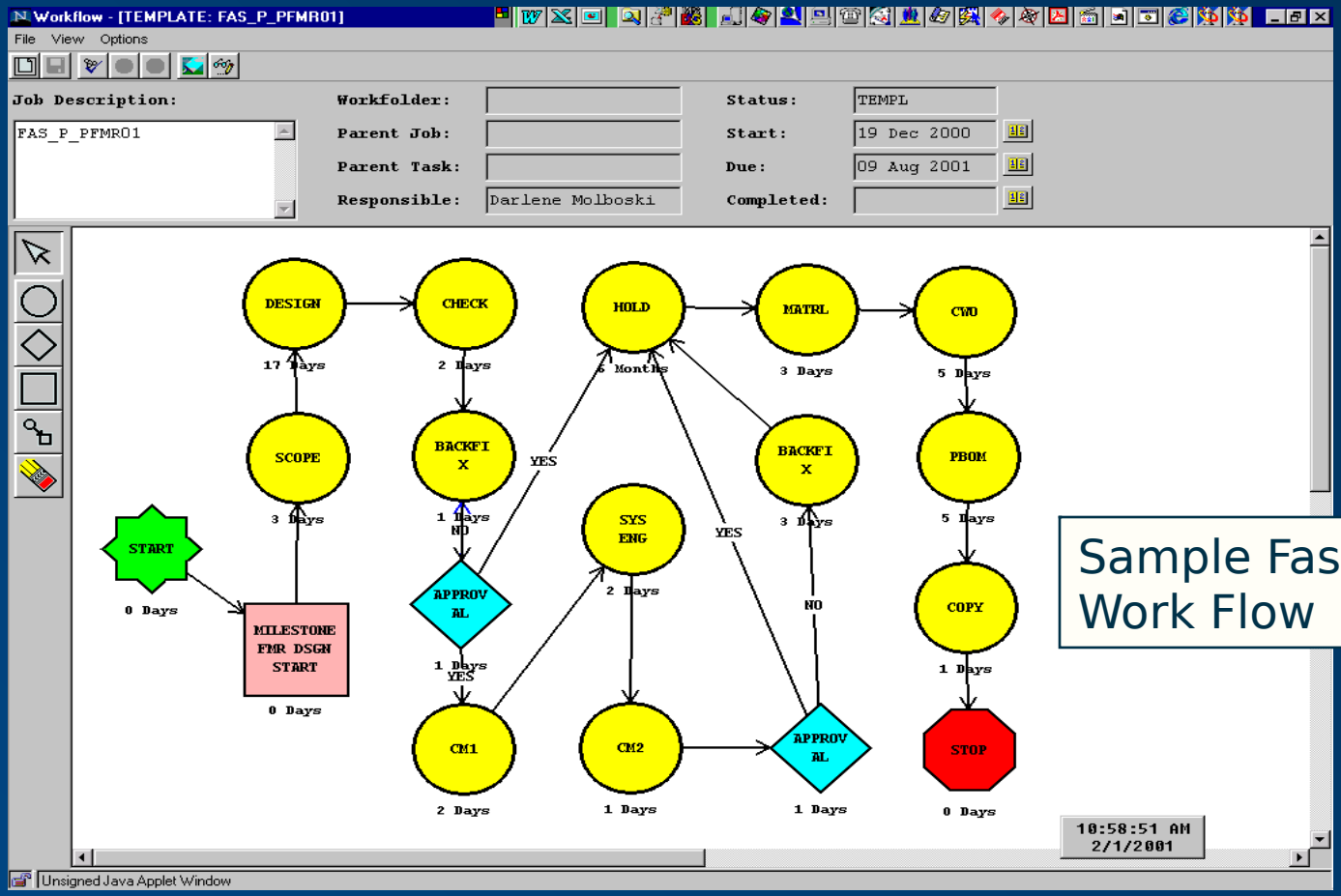
Pilot Results

- **Pilot in the Assembly Building (AB) on the 2220 and 2230 Units**
  - Pilot Results:
    - Verbal Response: 6 hrs → 30 mins →
    - EPS and Class Design Screening: 5 Days → 1 hr.
    - Design Time per EAR reduced by 15.75 hrs.
- **Very Positive Return on Investment numbers based on pilot results: ~40:1 in AB and ~85:1 in PO-2**
- **3 hours spent in production equated to 2 days of documentation - driving force to paperless environment**
- **The above results prompted the rapid infrastructure expansion**

Paperless Environment

- **Wearable / Fastrak integration**
  - Conceptually a good fit, but forced process change
- **Deck Plate documentation of issue**
- **Paperless transfer of information**
  - Allow pictures, sketches etc. to be attached to fastrak task
  - 2nd and 3rd tier cost savings
- **Integration with current Engineering Management Control System (EMCS)**
  - Class Designer can work on change immediately as fastrak derives its work order number directly from EMCS
- **This approach keeps the EPS personnel on the deck plates by releasing them of the administrative burden**

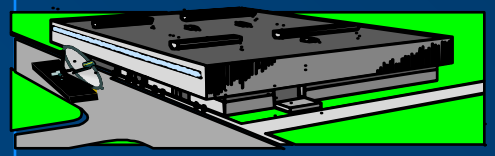
Its More Than Hardware

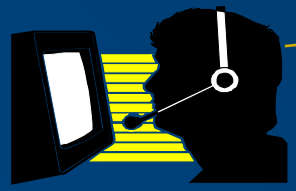


Sample Fastrak Work Flow

US Army Incorporation of ACD Into IBCTs

IBCT - ACD with CBM and Mobile Devices





Engineering Centers

Internet

Wireless LAN

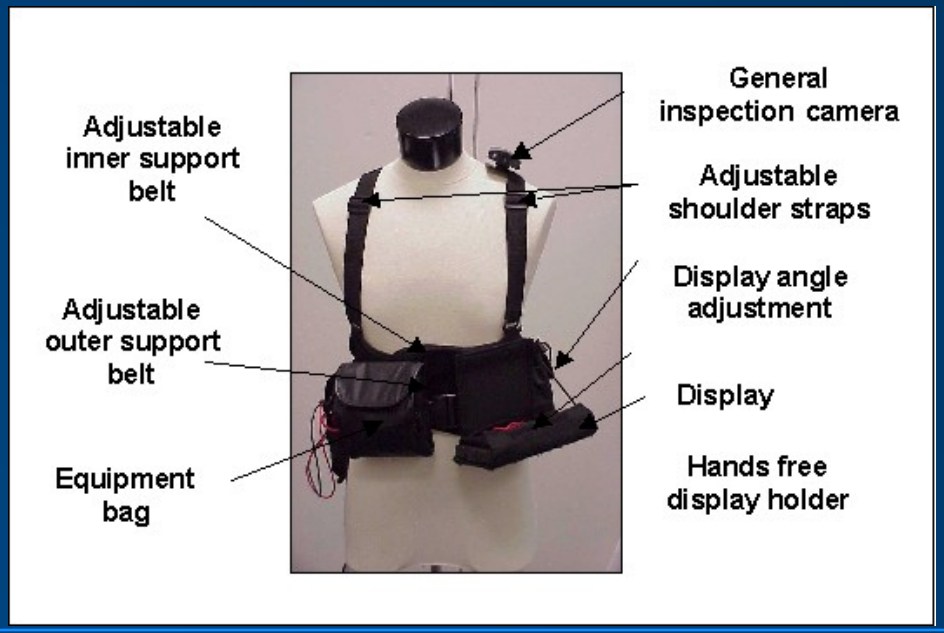
Maintenance Bay

Running Remote Maintenance with Internet NetMeeting voice and video on Portable Computer over wireless LAN. Will incorporate use of Intelligent tools for analysis and fault isolation/reconfiguration.

Virtual Test Equipment

The ”Tele-Maintainer” System

Replacement Available	# of SCAT Instruments	% of Total	Replacement Breakdown	Numerical Breakdown	% of Breakdown
YES	84	24.35%	As Is	35	10.14%
			With 100x Probe	49	14.20%
NO	89	25.80%	None Currently	83	24.10%
			Not Practical[1]	6	1.74%
Undetermined[2]	25	7.25%	Undetermined[2]	25	7.25%
Probe or Attachment[3]	147	42.60%	Probe or Attach.[3]	147	42.60%
TOTALS	**345**	**100%**		**345**	**100%**



Via II With Virtual Test Equipment/Tele-Maintainer

DDG Mod (DDG-83) and Out-year Wireless Installs

Shipboard Data Exchange

The Vision.

Ship's Mobile IT Devices

PDAs

Laptops

Barcode Scanners

Wearable Computers

Wireless

Work-Stations Data Exchange

Wireless LAN or IRDA

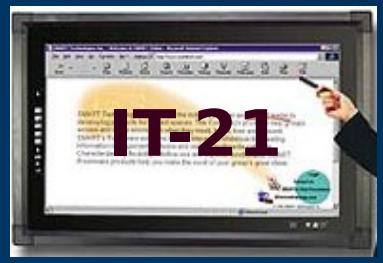
Antenna/Receivers

Laptop and Docking Station

42" Gas Plasma Touch Screen, BHD Mounted. 6" Thick, Helo-Spring shock mounts (USS Coronado).

Ship's LAN

Command and Control



Two 42" Gas Plasma Touch Screens, BHD Mounted w/Integrated Computer Terminals Hardwired to Ship's LAN. Helo-Spring shock mounts (USS Coronado).

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Brunswick Naval Air Station - SmartWing

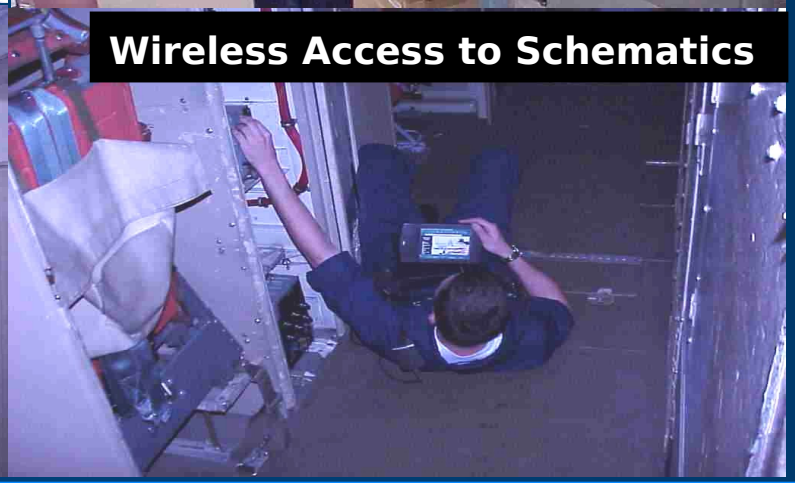
Navy Technicians “Trouble-Shooting”

Wireless Electronic Tech Manuals

Multi-meter “Virtual” Test Equipment

WWC with Digital Camera

Wireless Access to Schematics



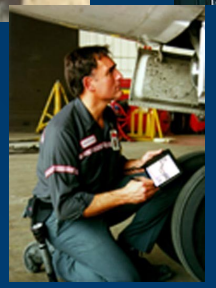
The Wireless Wearable Computer is a tool that can facilitate the following:

Facility Applications

- Annual Inspection Surveys
- Facility Reporting
- Asset Management Systems
- Construction Administration
- Quality Assurance
- Site Survey
- Emergency Response Support
- Security
- WMD Response Support





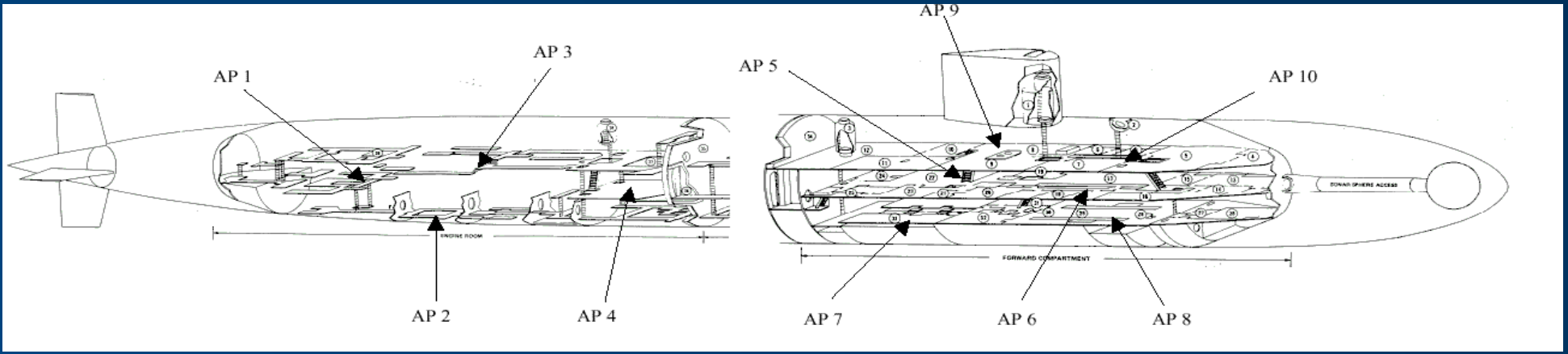



Portsmouth Naval Shipyard

Portsmouth Naval Shipyard Initiatives (SmartBase)

- Wearable Computers and Wireless Network
- Asset Tracking System
- Barcode Scanning System
- Process Development
- System Engineering and Test
  - Bath Iron Works industrial environment
  - Leverage existing wireless infrastructure

Wireless LAN Coverage Analysis Conducted Onboard USS City of Corpus Christi

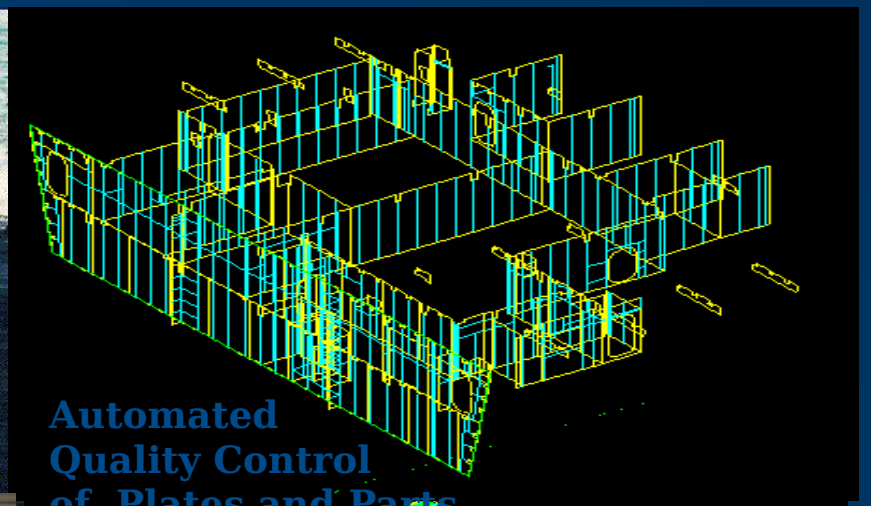


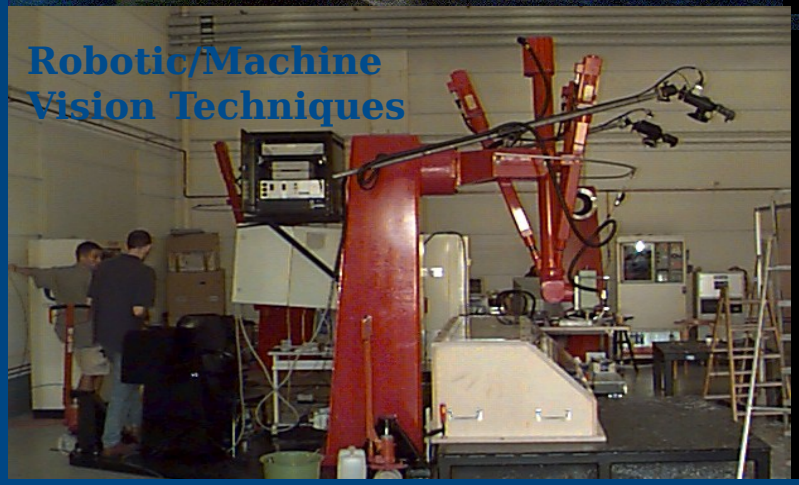
Installing System in Shipyard to Support Production Improvements

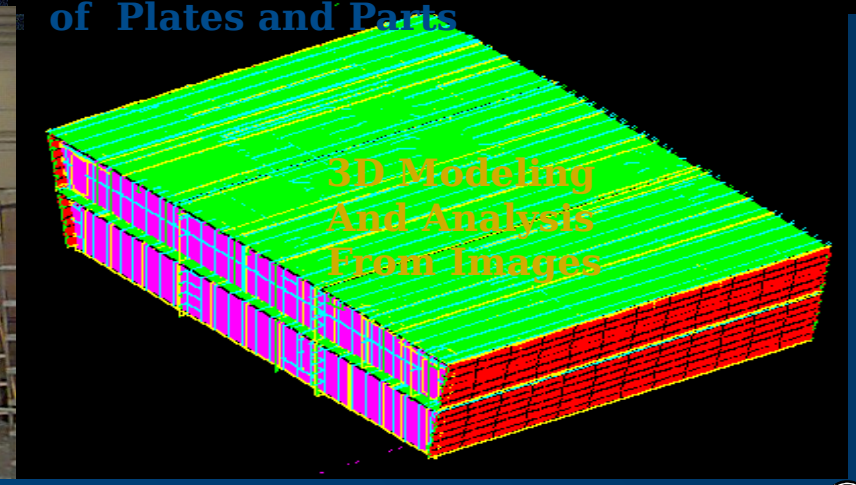
USS City of Corpus Christi first surveyed 22-26 July 2001

Modeling Support Migration

Future Development - AR Models/Feducial Tracking







USS Barry - Digital MP Program

Digital MP Technology for Afloat Security

- Exploitation of Joint Army/DARPA/Industry Initiative
- Conducted May 2001
- Demonstration of Wearable Computer Based Facial Recognition to Support Inport Security
- 100% Threat Detection of Unbriefed Intruders at the Quarterdeck (24)
- Field Deployable by Army Standards
- Joint Solution to Common DOD Problem
- Installed in One Day

Functional Control

“Vision-Man” Bridge Control System

Presidential Inauguration

Special Mission Applications

Mass Casualty - Weapons of Mass Destruction

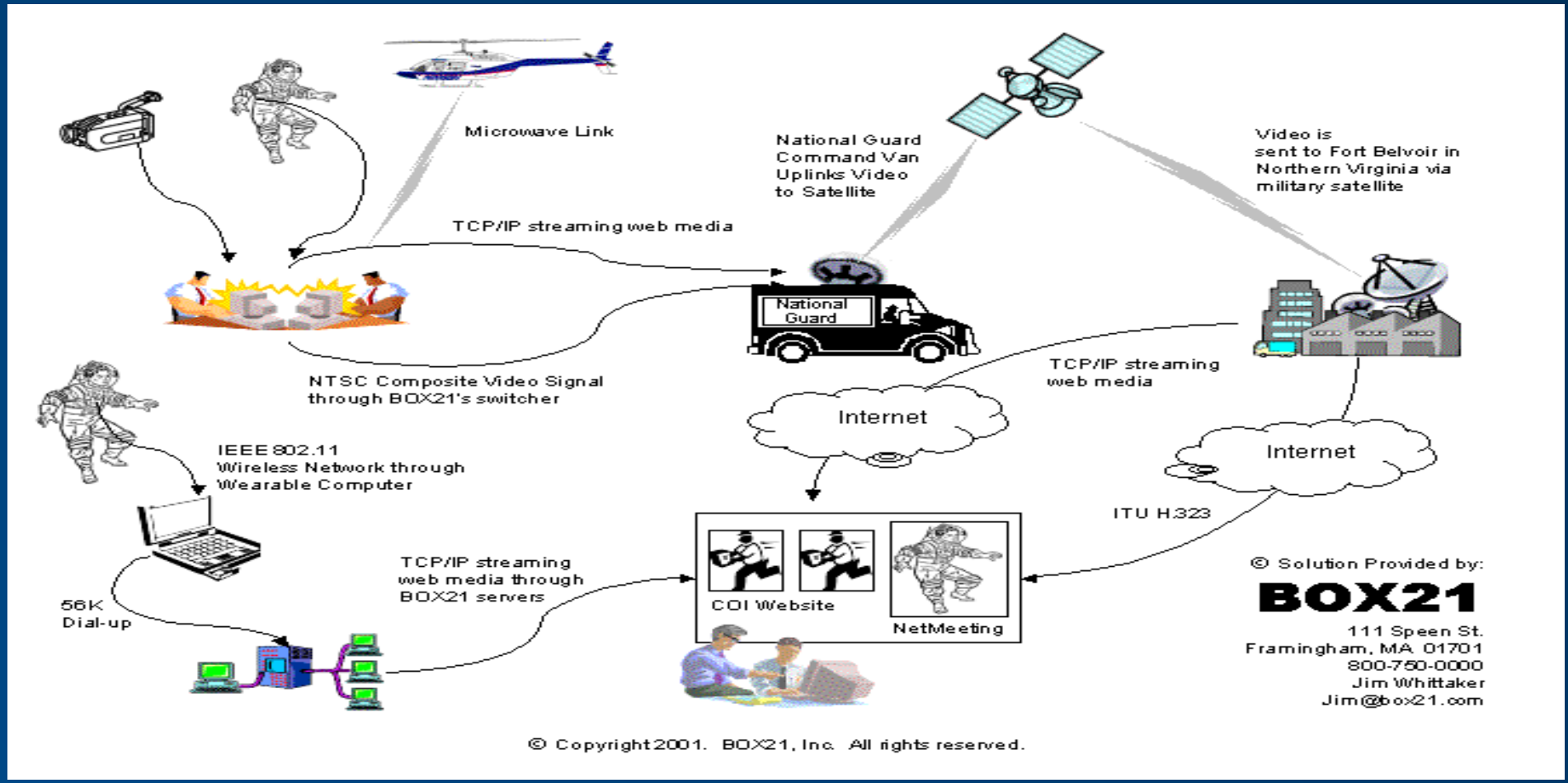
Participated in Three Drills (00)

- Boston Logan National Aircrash Drill
- Madawaska Mass Casualty Drill
- Westover AFB, Chickopee, MA

Boston Logan Air-crash Drill

Madawaska

Westover AFB, Chickopee MA



Bellerphon

Mt.Everest and Antarctic Testing

http://www.thepoles.com/explorer/expindex.shtml

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